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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,376	07/30/2003	Eric J. Bergman	54008.8033.US00 P03-0004	2135

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EXAMINER	
EL ARINI, ZEINAB	

ART UNIT	PAPER NUMBER
1746	

DATE MAILED: 11/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/631,376	BERGMAN, ERIC J.	
	Examiner	Art Unit	
	Zeinab E. EL-Arini	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *13-18* is/are allowed.

6)☒ Claim(s) *1-12 and 19-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *07/06/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, 8, 9, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Wong (5,423,944).

Wong discloses a method and an apparatus for etching a silicon wafer. The method comprising using hydrogen fluoride vapor, water vapor combined with ozone. Wong discloses the HF vapor is delivered into the chamber via a carrier gas, the carrier gas comprises inert gas. Re claims1-6, 8-9,12, see col. 1, lines 44-66, col. 2, lines 38-65, col. 4, lines 7-24, and claims 1-2, 6-7, 12-13, and Fig. 1.

However, Wong does not teach the step of oxidizing a layer of silicon on the wafer, the step of oxidizing a layer of silicon on the silicon wafer by using ozone gas is inherent property of the ozone in the Wong process. See col. 4, lines 7-24, and Fig. 1.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Zazzera et al. (XPS and SIMS study of anhydrous HF and UV/Ozone-Modified Silicon (100) Surfaces, article).

Zazzera et al. disclose a method of etching a silicon wafer comprising placing the wafer into a process chamber, oxidizing a layer of silicon on the wafer into SiO2; delivering HF into the process chamber to react with the SiO2 layer and convert the SiO2 layer into SiF4, and removing the SiF4 as claimed. See summary, on page 490.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 19-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi (5,944,907) in combination with Verhaverbeke et al. (5,922,624) and Wong.

Ohmi discloses a method and device for cleaning a semiconductor wafer. The method comprising cleaning the substrate using pure water containing ozone to form oxide film; contacting the substrate with HF; rinsing with pure water; and removing the oxide film with the HF. See col. 2, lines 41-48, col. 4, line 53- col. 5, line 7, col. 5, lines 16-27, lines 35-40.

Ohmi does not teach reacting the HF with the SiO2 layer, delivering the HF in vapor form, HF vapor delivered into the process chamber via a carrier gas, the carrier gas, mixing the ozone and the HF, and the removing step as claimed.

Verhaverbeke et al. disclose a method for semiconductor processing comprising etching of oxide layers, especially etching thick SiO2 layers in the has phase with a mixture comprising hydrogen fluoride. See the abstract. The reference discloses the reacting step, and the exhausting step as claimed. See col. 3, lines 10-19, col. 4, lines 10-33, and the document in general.

Wong as discussed supra discloses delivering the HF via a carrier gas and the gas carrier, and the mixing step as claimed.

It would have been obvious for one skilled in the art to use the reacting step taught by Verhaverbeke et al. in the Ohmi process to remove the

oxide layer as claimed. This is because reacting HF with the oxide layer on the silicon wafer is well known in the art.

It would have been obvious for one skilled in the art to use the carrier gas, the delivering step and the mixing step taught by Wong in the Ohmi process to improve the etching process. This is also because all references are from the same technical endeavor, which is etching or cleaning the semiconductor wafer by using HF.

6. Claims 7, and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong.

Wong as discussed supra does not disclose bubbling the carrier gas through the HF solution, and forming the condensate film of HF vapor on the wafer surface as claimed.

It would have been obvious for one skilled in the art to use the process taught by Wong to obtain the claimed process. This is because from Fig. 1, one skilled in the art would bubbling the gas into the solution in the chamber, if the passageway 12 is submerged in the solution in the process chamber. Forming condensate film of HF vapor on the surface of the wafer is inherent in the Wong process.

Allowable Subject Matter

7. Claims 13-18 are allowed.

8. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record failed to teach a method of thinning a silicon wafer, comprising delivering anhydrous gas into the process chamber; spraying DI water onto a surface of the wafer simultaneously with the step of delivering anhydrous gas into the process chamber; dissolving the anhydrous HF gas into the DI water on the wafer surface; and etching the oxidized silicon layer with the dissolved anhydrous HF gas to decrease a thickness of the wafer as claimed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeinab E. EL-Arini whose telephone number is (571) 272-1301. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Zeinab El-Arini
Zeinab E. EL-Arini
Primary Examiner
Art Unit 1746

ZEE
11/17/04